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Inhomogeneous current distribution in a bimetal ferromagnet/superconductor film in a longitudinal magnetic field

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Abstract

The proximity effect of the ferromagnetic metal/superconductor (FM/S) bilayers in a external longitudinal magnetic field is considered in the dirty limit. The critical temperature and the superconducting current distribution versus applied magnetic field's magnitude, film's thicknesses and a transparency of the contact is calculated, with taking into account an umklapp processes possibility on the interface of the FM/S contact. It is shown that superconducting current is strictly inhomogeneous and asymmetrical. It is shown also that the current inhomogeneity depends heavily from the FM/S interface transparency.

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Keywords

Critical temperature, Ferromagnet/superconductor bilayers, Magnetic field, Proximity effect, Superconductivity, Supercurrent, Umklapp processes